

REMARKS

This application has been reviewed in light of the Office Action dated November 30, 2005. Claims 1-50 and 53-104 are presented for examination. Claims 3-6, 11, 13, 31, 32, 41, 42, 53, 54, and 66 have been amended to define still more clearly what Applicants regard as their invention. At least the changes made to Claims 5, 13, 31, 32, 42, 53, and 66 are not believed to affect their scope. New Claims 83-104 have been added to provide Applicants with a more complete scope of protection. Claims 51 and 52 have been canceled without prejudice or disclaimer of subject matter. Claims 1, 3-5, 7, 11, 13-15, 20, 23, 26, 28, 33, 37, 41-43, 53, 55, 62, 65, 69, 71, 73, 74, 76, 79, 87, 93, and 98 are in independent form. Favorable reconsideration is requested.

The specification has been amended to correct a typographical error.

The Office Action does not address Claims 33-36 at all, nor does the Office Action reply to the Response To Restriction Requirement filed on September 16, 2005. Therefore, it is respectfully noted that the Office Action is incomplete, and thus any next office action should be made non-final.

Page 6 of the Office Action states that "Claims 1, 2, 7-32, 55-64, 71-73 and 76-82 are allowed..." The Examiner is thanked for that indication. However, Page 3 of the Office Action rejected Claims 11 and 12 for the reasons noted below, and the Office Action Summary states that Claims 1, 2, 7-32, 37-40, 43-50, 55-73, and 76-82 are allowed. The Examiner is respectfully requested to correct these inconsistencies in the record.

Claims 4, 5, 13, 42, 53, 54 and 75 were objected to as being dependent upon a rejected base claim, but, according to the Office Action, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. All of those claims except for Claims 54 and 75 have been so rewritten, and thus are believed to be in condition for allowance.¹ Claim 75 has not been so rewritten at this time because, for the reasons given below, the base claim from which it depends is

1/ Clarifying changes also have been made to Claim 4.

believed to be patentable. Claim 54 has been amended to depend from Claim 53, and is believed to be patentable at least because it depends from an allowable base claim.

Claim 6 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, the Office Action states that “*the shifting is performed within a time delay less than to a total time,*’ is unclear” (Emphasis in original). Without conceding the propriety of this rejection, Claim 6 has been amended to even further clarify the claimed subject matter and ensure that it complies fully with the requirements of Section 112, second paragraph. Accordingly, withdrawal of the Section 112 rejection is requested.

Claim 4 was objected to because of an informality. Claim 4 has been amended as deemed necessary to overcome this objection. Accordingly, withdrawal of the objection is requested.

Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,583,861 (Holden) in view of U.S. Patent 6,683,848 (Parrish) and U.S. Patent 5,418,952 (Morley et al.).

As amended, Claim 3 recites a method for routing cells within a switch fabric. The method comprises receiving a plurality of cells within a frame, the frame being associated with a plurality of time slots, a subset of cells from the plurality of cells being uniquely associated with each time slot associated with the frame. The method also includes shifting, for each time slot associated with the frame, a frame position for the subset of cells associated with that time slot by an incremental amount from a prior time slot within the frame to produce a shifted frame. The shifting shifts the frame position for each cell of a column at least one additional row from a shifted frame position in a prior column.

Support for the amendment to Claim 3 appears in the originally filed patent application, at least in Fig. 20 and accompanying portions of the specification.

The Office Action cites Holden as disclosing a switching system that includes a switch fabric, wherein cells are associated with frames, and cells are associated

with frames with respect to cell priority. However, the Office Action concedes that Holden does not teach or suggest shifting frames.

The Office Action relies on Parrish as disclosing frame synchronization as associated in a switching environment, wherein frame pulses include time slots, occurrence of shifted frames, and time slot counter increments. The Office Action cites col. 4, lines 5-11, col. 5, lines 25-43, and col. 6, lines 11-16 of Parrish as support. The Office Action also cites Morley et al. as disclosing a computer system that includes switching functions for processing cells, wherein multiple cells and time slots are associated with each frame and there exist subsets of all cells with respect to cell position, and cites the Abstract, col. 10, lines 48-69, col. 14, lines 8-10, and col. 23, lines 21-30 of Morley et al. as support.

The cited portions of Parrish relate to service providers 14 communicating using a switching fabric 18 that supports time slots, a frame that includes a number of time slots corresponding to the number of ports associated with switching unit 10, a framing error that may include overlapping frames, shifted frames, misalignment, or loss of frames, and a generator 54 to generate frame pulses according to an associated time slot counter 56 and the number of ports associated with switching unit 10.

The cited portions of Morley et al. relate to a computer system for solution of real time interference problems, data buffering, tiles associated with a cell and being bound to it one at a time and run during respective time slots within a frame, and assignment of tiles to cells involving a so-called M-grouping.

It is respectfully submitted that nothing has been found, or pointed out, in either Holden, Parrish, or Morley et al., that would teach or suggest shifting a frame position for each cell of a column at least one additional row from a shifted frame position in a prior column, as set forth in Claim 3. Accordingly, Claim 3 is believed to be clearly patentable over those references, whether considered separately or in combination.

Claims 11 and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,367,549 (Vachee) in view of U.S. Patent Application Publication No. 2001/0010694 (Lindsey et al.).

As amended, Claim 11 is directed to a method for routing cells within a switch fabric. The method comprises time-division multiplexing a plurality of cells associated with a first frame and a plurality of RTSs, the first frame being associated with its own plurality of time slots, a plurality of input links and a plurality of output links. The method also comprises time-division demultiplexing a plurality of CTSs associated with a second frame. A first CTS from the plurality of CTSs associated with the second frame is associated with an availability of a first RTS associated with a cell from the plurality of cells associated with the first frame.

The Office Action cites Lindsey et al. as teaching a “switching communication system whereby switch fabric is utilized in association with time division multiplexing/de-multiplexing that accommodates RTS and CTS signals (paragraph 0097)”. However, the Office Action concedes that “Lindsey [is] silent on RTS and CTS associated with a frame.”

The Office Action then relies on Vachee to teach what is missing from Lindsey et al., and cites the Abstract, Figs. 1 and 2, col. 2, lines 54-68, col. 4, lines 44-45, and col. 5, lines 58-68 of Vachee et al. as support.

Col. 4, lines 44-46 of Vachee refers to “Request to Send” (RTS), to transfer a control signal which causes the DCE to assume the transmit mode....”

Col. 2, lines 54-68 of Vachee et al. refers to an alleged improved time division multiplexing method and apparatus for combining a data signal and several secondary binary signals into a train of pulses, whereby data signals can be transmitted at various bit rates in synchronous or asynchronous mode. An interface transmitter embodies the multiplexing method to transmit data, control and timing signals exchanged by two DTEs over one transmission line.

Col. 5, lines 58-68 of Vachee refers merely to a time-division multiplexing technique that divides up a train of bits into successive blocks of identical length called frames.

However, it is respectfully submitted that, even if Vachee be deemed to

refer to a Request to Send (RTS) transmitting circuit, nothing has been found, or pointed out, in Vachee that would teach or suggest time-division multiplexing a plurality of cells associated with a first frame and a plurality of RTSs, and time-division demultiplexing a plurality of CTSs associated with a second frame, as set forth in Claim 11. Indeed, multiplexing/demultiplexing in Vachee is understood to occur merely with respect to a data signal and N secondary signals using two different frames termed “synchronous frame” and “asynchronous frame”.

Because neither Vachee nor Lindsey et al. is seen to teach or suggest the foregoing features of Claim 11, even if those references were to be combined in the manner suggested in the Office Action (assuming such a combination would even be permissible), the resulting combination also would not teach or suggest those features. Accordingly, Claim 11 is believed to be clearly patentable over those references, whether considered separately or in combination.

Claim 74, was rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2003/0048792 A1 (Xu et al.) in view of U.S. Patent Application Publication No. 2002/0181455 (Norman et al.). This rejection is respectfully traversed for the following reasons.

Claim 74 recites, in part, a switching fabric coupled to the plurality of input ports and the plurality of output ports. The switching fabric has a distributed scheduler configured to schedule the routing of a plurality of cells from a plurality of input ports to a plurality of output ports. The distributed scheduler has a control path with its own rate and a data path with its own rate. The rate of the control path of the distributed scheduler is less than a rate of a control path of a centralized scheduler with a data path having a rate similar to the data rate of the distributed scheduler.

Paragraphs 0042 to 0049 of Xu et al., relied on in the Office Action, relate to a processing flow of queuing and scheduling of data. Input data is filtered according to three groups: low priority, mid-priority, and high-priority. Paragraph 0043 refers to priority processing being partitioned into two levels: CoS/ToS at ingress and QoS at egress,

such that there is matching scheduling on both a per port basis and on a per COS/QoS basis. Paragraph 0044 refers to a centralized scheduler containing universal scheduling for uniform traffic, and self-adaptive scheduling for non-uniform traffic. The Office Action concedes that “Xu is silent on control path with its own rate associated with scheduler.”

Paragraph 0013, 0017, and 0073 of Norman et al. refer to a centralized nature of arbitration disadvantageously limiting throughput of a switch as a data rate increases, a switch fabric with distributed scheduling, arbitration and buffering, and a receiver in a destination cell relying on a flag 208 that provides occupancy information regarding an off-chip queue 228, wherein the destination cell is prevented from requesting transmission of a packet unless it can be accommodated by the queue 228.

Paragraph 0234 to 0238 of Norman et al. relate to an implementation of an off-chip packet-forwarding module 226 and its interaction with input interfaces 116 and 118. If data path 252 is narrower than data path 230, then input interface 116 should be configured to provide a rate matching functionality so that the total information transfer rate remains the same on both data paths.

It is respectfully submitted that nothing has been found, or pointed out, in either Xu et al. or Norman et al. that would teach or suggest that a rate of a control path of a distributed scheduler is less than a rate of a control path of a centralized scheduler with a data path having a rate similar to the data rate of the distributed scheduler, as set forth in Claim 74. Accordingly, that claim is believed to be clearly patentable over those references, whether considered separately or in combination.

Independent Claim 41 was rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,317,562 (Nardin et al.) in view of U.S. Patent 5,640,389 (Masaki et al.).

Claim 41 has been amended to clarify that the plurality of cells are sent only after every cell associated with a time slot is received, but not before all such cells have been received. For example, as amended, Claim 41 is directed to a method comprising receiving a plurality of cells associated with a first time slot, each cell from the plurality of

cells being uniquely associated with its own cell framer and its own receipt time. Next steps include buffering cells from the plurality of cells as they are received until every one of the plurality of cells is received, and sending the plurality of cells substantially aligned in time, only after every cell from the plurality of cells is received within a timeout period, and not before all of the plurality of cells have been received.

The Office Action cites Nardin et al. as disclosing routing cells in a management switching system wherein the architecture includes an NTC for performing framing, cells are buffered according to priority, and timeout events occur (Abstract, col. 5, line 11 through col. 6, line 55, and col. 8, line 68), and states that “Nardin is silent on multiple framers.” The cited portions of Nardin et al. relate merely to a network trunk card 182 and interface 184 making up a trunk card network interface group 180, a queue buffer 210 containing four distinct buffer memories for four classes of data: (1) High Priority (HP), (2) High Speed Deterministic (HSD), (3) Low Speed Statistical (LSS), and (4) Voice. HP 212 contains the highest priority data relating to system operation and control, and is granted the highest priority by a server 226. Remaining queues are serviced so as to guarantee minimum bandwidth availability to each data type (see, e.g., col. 5, line 11 to col. 6, line 29). Col. 8, lines 66-68 refers merely to a state table that ‘rekicks’ (restarts) itself periodically - every 15 seconds, with a timeout event.

Masaki et al. is cited as teaching “communicating and processing packet data wherein the architecture includes plurality of cell framers, switching fabric, wherein a selector distributes plurality of cells to cell framers (Fig. 15, col. 20, line 65 thru col. 21, line 35).” The cited portion of Masaki et al. relates to a line distributor 1520 which selects output lines A and B in turn (Fig. 15), and outputs from a selector 1540 cells to framers 1541 and 1542. A line distributor 1520 requires only a small amount of buffer memory in framers 1541 and 1542. Priorities can be set so as to give highest priority to connections in which cells containing network control information are inserted, since it is the delay of these cells that has the greatest adverse impact on network performance.

It is respectfully submitted that nothing has been found, or pointed out, in

either Nardin et al. or Masaki et al., that would teach or suggest buffering cells from a plurality of cells associated with a first time slot as they are received until every one of the plurality of cells is received, and sending the plurality of cells substantially aligned in time, only after every cell from the plurality of cells is received within a timeout period, and not before all of the plurality of cells have been received, as set forth in Claim 41.

Accordingly, Claim 41 is believed to be clearly patentable over those references, whether considered separately or in combination.

Claims 51 and 52 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2001/0010694 (Lindsey et al.).

Without conceding the propriety of this rejection, those claims have been canceled, thereby rendering their rejection moot.

The following comments are now offered with regard to the independent claims added herein.

Added independent Claim 87 recites an apparatus comprising at least one distributed scheduler arranged to receive control information and data from at least one source within randomized time slots, perform arbitration based on the control information, and specify to the at least one source at least one destination to which the at least one source should forward further data associated with the control information.

Added independent Claim 93 is directed to a method for identifying a path to forward data. The method comprises receiving control information and data from at least one source within randomized time slots, performing arbitration based on the control information to determine a mapping of which source will be routed to which output, and specifying at least one path through which to route further data associated with the control information from the at least one source to at least one destination.

Added independent Claim 98 recites a method for synchronizing transmissions, comprising providing a start indicator on a periodic basis that is determined based on a slowest sending component among a plurality of sending components, and transmitting a superframe in response to each start indicator.

It is respectfully submitted that the references relied on in the Office Action are not understood to teach or suggest the foregoing features of independent Claims 87, 93, and 98. Accordingly, those claims are believed to be clearly patentable over those references.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable over the art relied on in the Office Action for the same reasons as are those respective independent claims. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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